The Industrial Hygienist's Role in Health Surveillance for High-Speed Combatant Craft Operators

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MK V High Speed Craft

- Capable of high speeds
- Carries SEALs
- 4 boat operators (Surface Warfare Combatant-craft Crewman - SWCC)

Common SWCC Injuries

- Lower back
- Neck
- Knee
- Shoulder

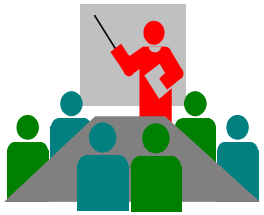
Why Study Repeated Impact?

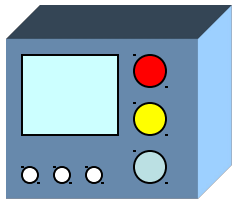
- Reduce injuries
- Improve human performance on high speed craft
- Develop an injury model

THREE METHODS TO REDUCE HIGH SPEED CRAFT INJURY

OPERATIONAL
Tools for SWCCs to Protect Themselves

Awareness Training, Physical Conditioning, SOPs, Lights & Alarms

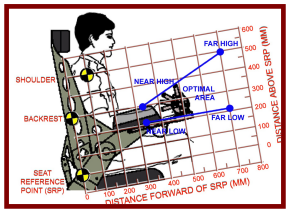




Automobile Analogy:
Driver's education, speed limits, speedometer.

IMPACT ISOLATION
Tools Provided to SWCCs

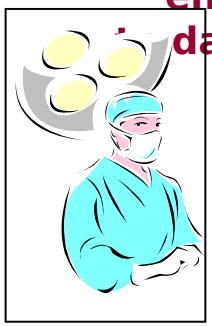
Advanced Hulls, Ride Control Systems, Ergonomics, Suspended Seats, etc



Automobile Analogy:
Seat belts, airbags, well-placed controls, advanced shock absorbers.

OVERSIGHT
Safety & Health Authority (Occup Health, NMCSD)

Human Dosimeters on all SWCCs; data period… ente… data



Automobile Analogy:
"Black Box" units on race cars, GPS units on trucks, and police.

Need for Ergonomic Improvement

- Seats
- Throttle Location
- Privateer (computer station) Location

MK V Seats

Stidd v4 Rigid Seat → tidd-Taylor v5 Sea

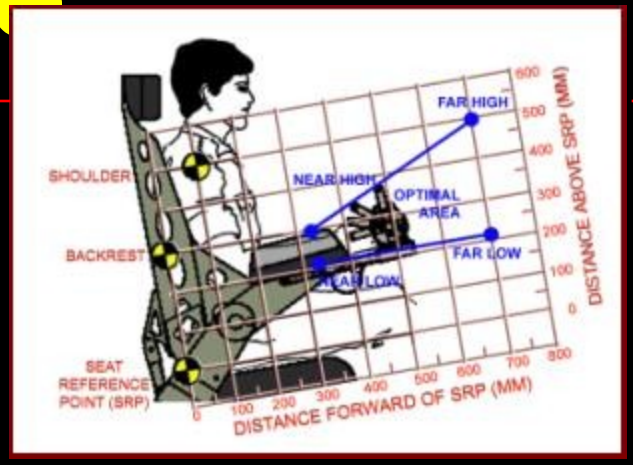
MK V Seat Testing

- Conducted by NSWC Panama City, NAVSEA
- 2 day test run to Santa Barbara
- Compared V4 seat (original) to V5 seat (new)
- Used crash test dummies
- Used Modified ISO 2631 Part 5 (2003) Spine Stress Dose (Sed, 8 hr)

Results of MK V Seat Tests

- v5 seat (newer seat) lowered exposure to shock and vibration by 20-40 percent
- Spine Stress Dose for both v4 and v5 seats exceeded recommended exposure levels

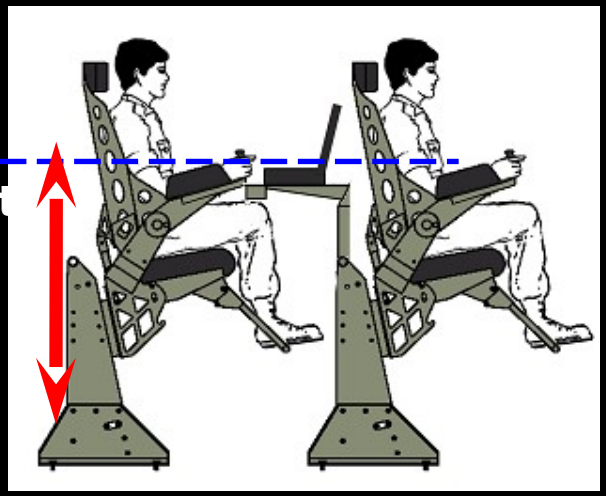
Throttle


FAR HIGH
SHOULDER
NEAR HIGH
OPTIMAL AREA
BACKREST
FAR LOW
NEAR LOW
SEAT REFERENCE POINT (SRP)
DISTANCE FORWARD OF SRP (MM)
DISTANCE ABOVE SRP (MM)

NAVSEA
PANAMA CITY
Not For Redistribution

Privateer (computer station)

Seat Displacement
1 Inch Rise +
4- 5 Inch Seat Separation
6 Inch Fall



Current Privateer Layout → New Privateer Design

Current Medical Surveillance

- Performed by NHRC:
  - Medical questionnaires
  - Pegboard range-of-motion t
  - Blood and urine tests
  - DXA bone density sca
  - Lumbar Motion test

DXA Bone Density Scan

Lumbar Motion test

Long-term Medical Surveillance

- All operational SWCCs should be in a Medical Surveillance Program!
- Currently, a relevant Medical Surveillance Program does not exist
- NHRC and NMCSD Occupational Med/Health Department plan to develop a “Repeated Impact” Medical Surveillance Program

Role of Industrial Hygiene

- Identify “Repeated Impact” Similar Exposure Groups (SEGs) for SWCCs
- Collect personal exposure data (once personal dosimeters developed)
- Work with Occupational Health/Medicine to recommend medical surveillance

Discussion

- MK V operators are still at risk of injury
- Need for a physiologic model
- Need for a Medical surveillance program
- PT program
- Training
- Lights/alarms as warnings to protect hull and humans
- Need to influence design standards and performance criteria

Acknowledgements

- NAVSEA
- SPECBOAT Teams 12 and 20
- Combatant Craft Division
- NSWC Panama City
- Naval Health Research Center
- Navy Ergonomics Program

QUESTIONS???

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